

# 7

User's Guide to:  
Phoenix Vessel Technology Limited

End port pressure vessels Models: 1615 - 400 psi  
1614 - 600 psi  
3343 - 1000 psi  
1381 - 1000 psi  
1755 - 1200 psi

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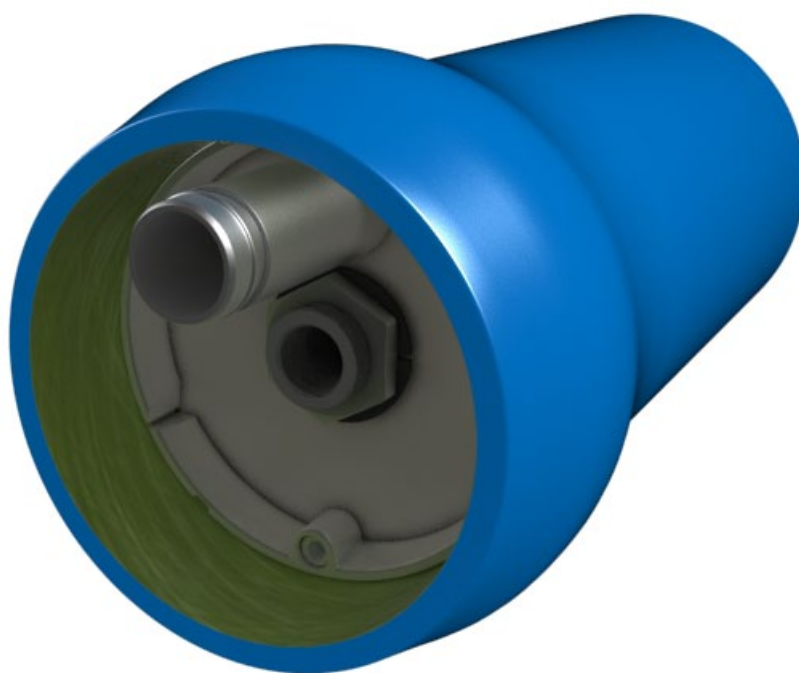
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## FORWARD

Phoenix Vessel Technology is a major manufacturer of Glass Reinforced Plastic Pressure Vessels which are used as housings for reverse osmosis membrane elements. It is one of a small number of companies with Code X accreditation of the American Society of Mechanical Engineers.

Vessels are produced to cover a range of pressures upto 1200 psi and to house seven 40" or five 60" membrane elements.

Each vessel has a documented history in terms of the manufacturing process and the materials used. Before despatch, each vessel is tested to 1.1 times working pressure to ensure structural integrity.



This User's Guide applies to the series of 8" End Ported pressure vessels which have a 1" female product tube connection. The following Assembly Drawings are applicable :

- (1) 1MNC 1615 - 8" 400 psi Model
- (2) 1MNC 1614 - 8" 600 psi Model
- (3) 1MNC 1381 - 8" 1000 psi Model
- (4) 1MNC 1755 - 8" 1200 psi Model

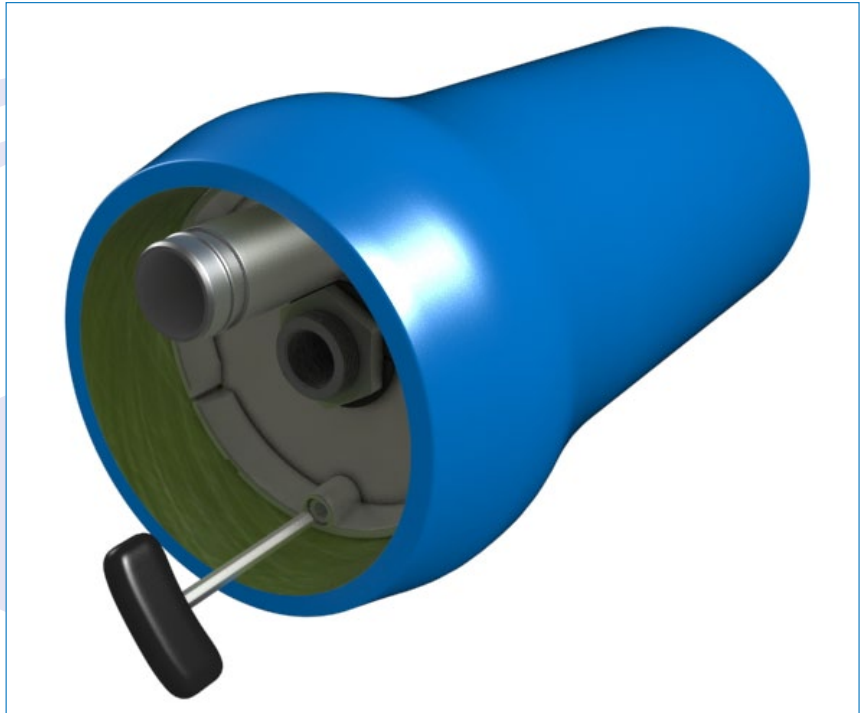
## SECTION ONE MAINTENANCE GUIDE

### 1.1 REMOVING END CAP FROM VESSEL

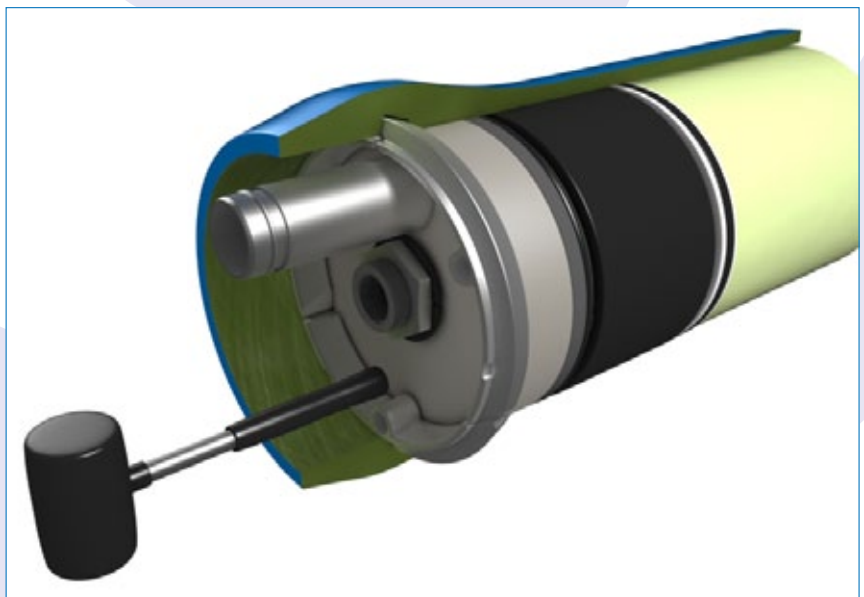
1.1.1 Ensure system is NOT pressurised before starting work.

1.1.2. Remove couplings connecting vessel ports to manifolds and move them clear of the vessel. Remove connections if fitted from the central product port.

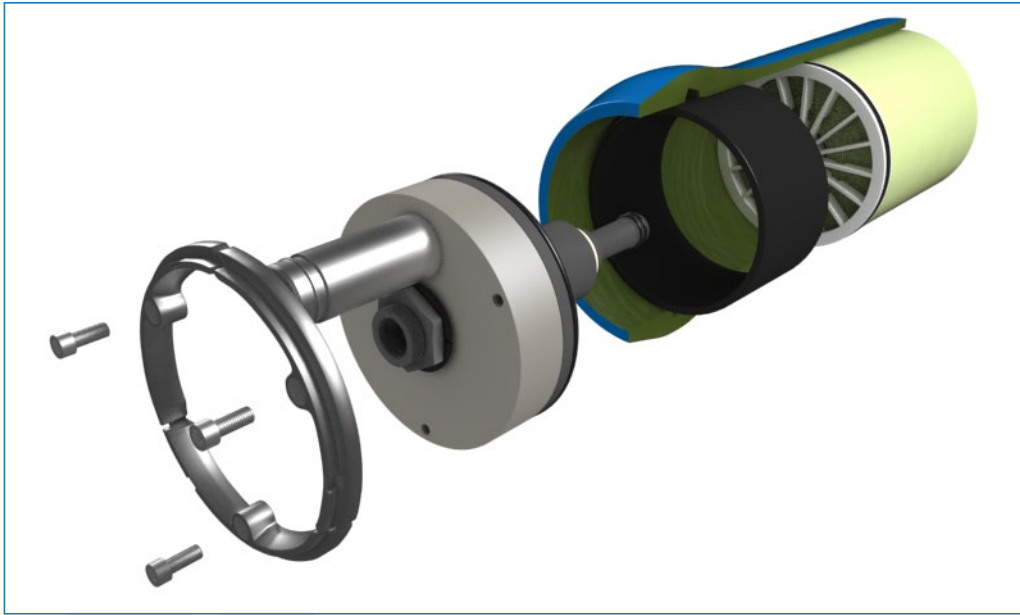
1.1.3. Using an 8mm hexagonal T bar or Allen key remove the 3 caphead screws located in recesses in the cast retaining rings.



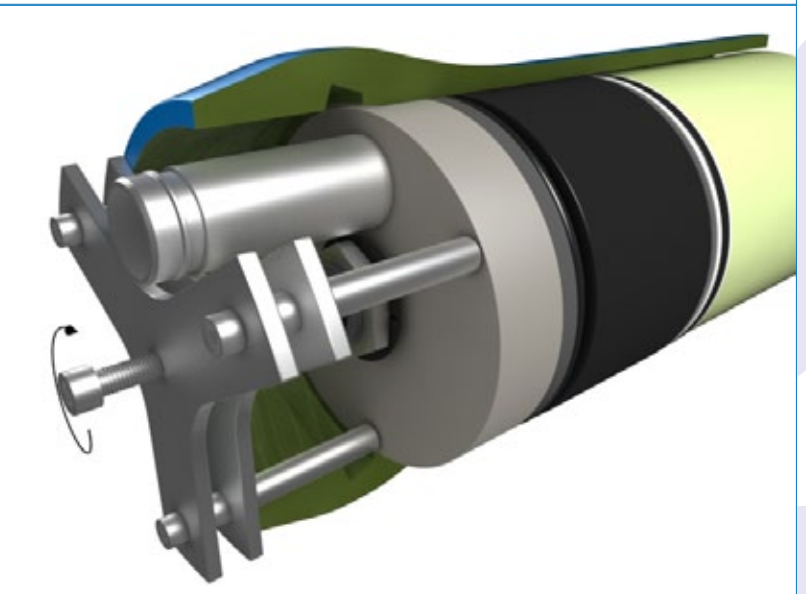
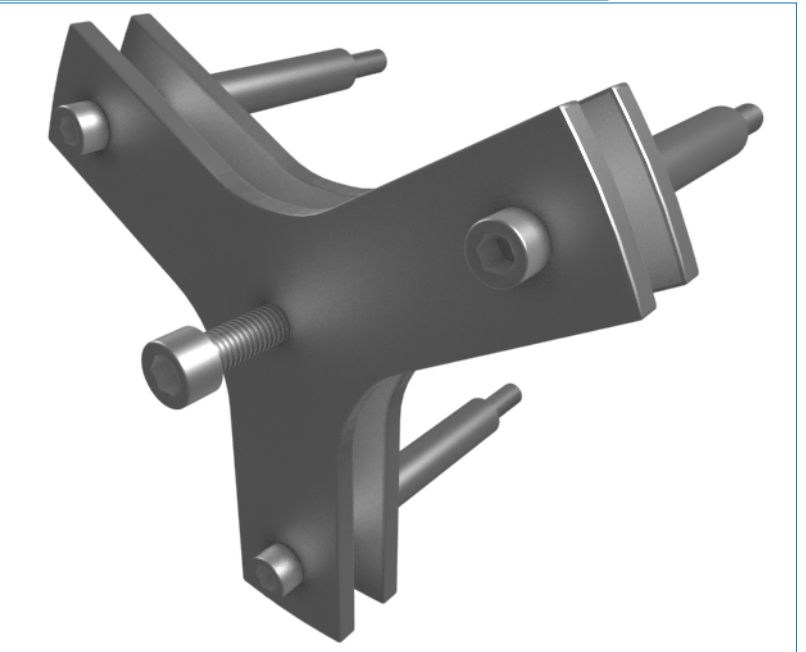
1.1.4 Remove the 3 segment retaining ring . Each segment has a slot at one end to enable it to be levered out. If removal is difficult then start at the point where the gap between two segments is greatest. It may



1.1.5 Grasp the two ports and remove the end cap with a gentle rocking motion.

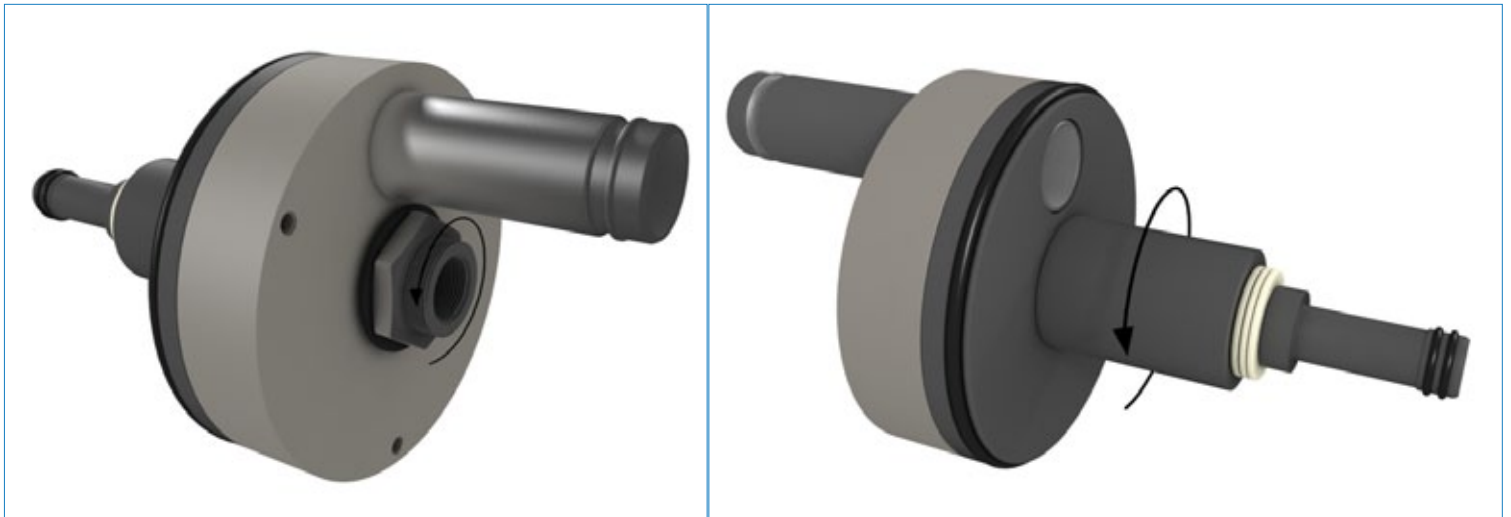


1.1.7 If the End Cap cannot be removed as indicated then the use of an extractor will be necessary. The design consists of two tripods and 3 long cap head screws (M10x1.5) – these are screwed into the securing screw threads of the End Cap. Extraction load is applied via the large threaded bolt at the centre axis. This is illustrated below (although the exact design may differ slightly). The part number of this Extractor is 2986

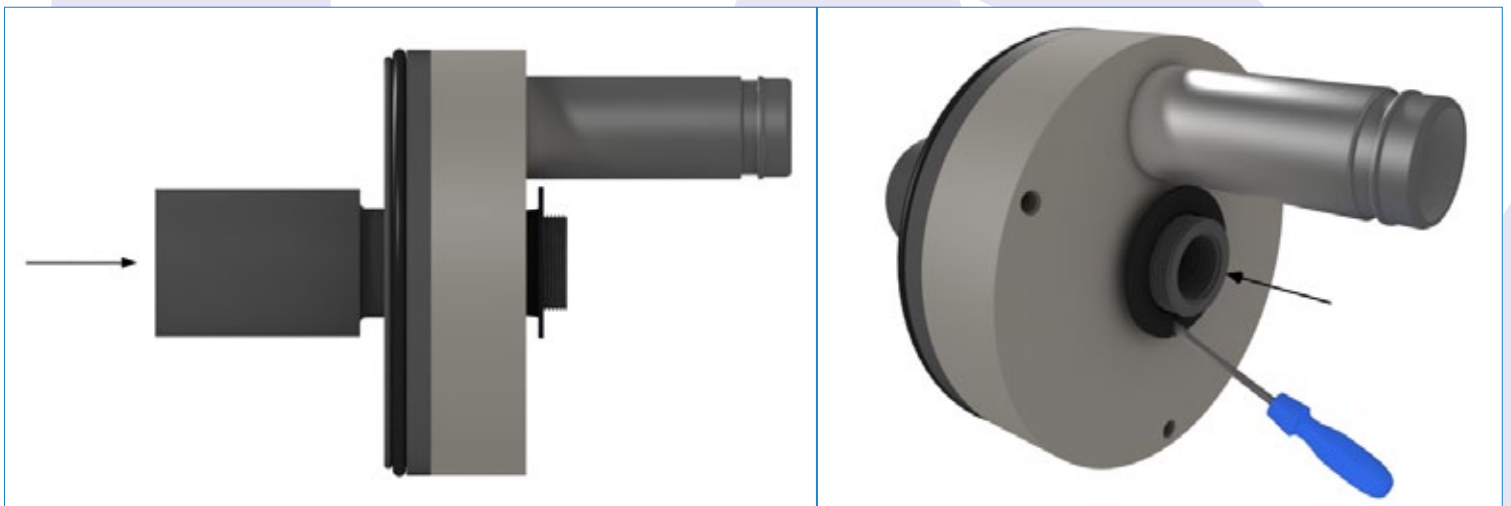


## 1.2 COMPONENT DISASSEMBLY

- 1.2.1 With the end fitting extracted. Unscrew the backnut located on the product tube. Grasp the product tube and unscrew the product tube from the end cap approximately 2 turns until a gap of 5 to 10mm appears.

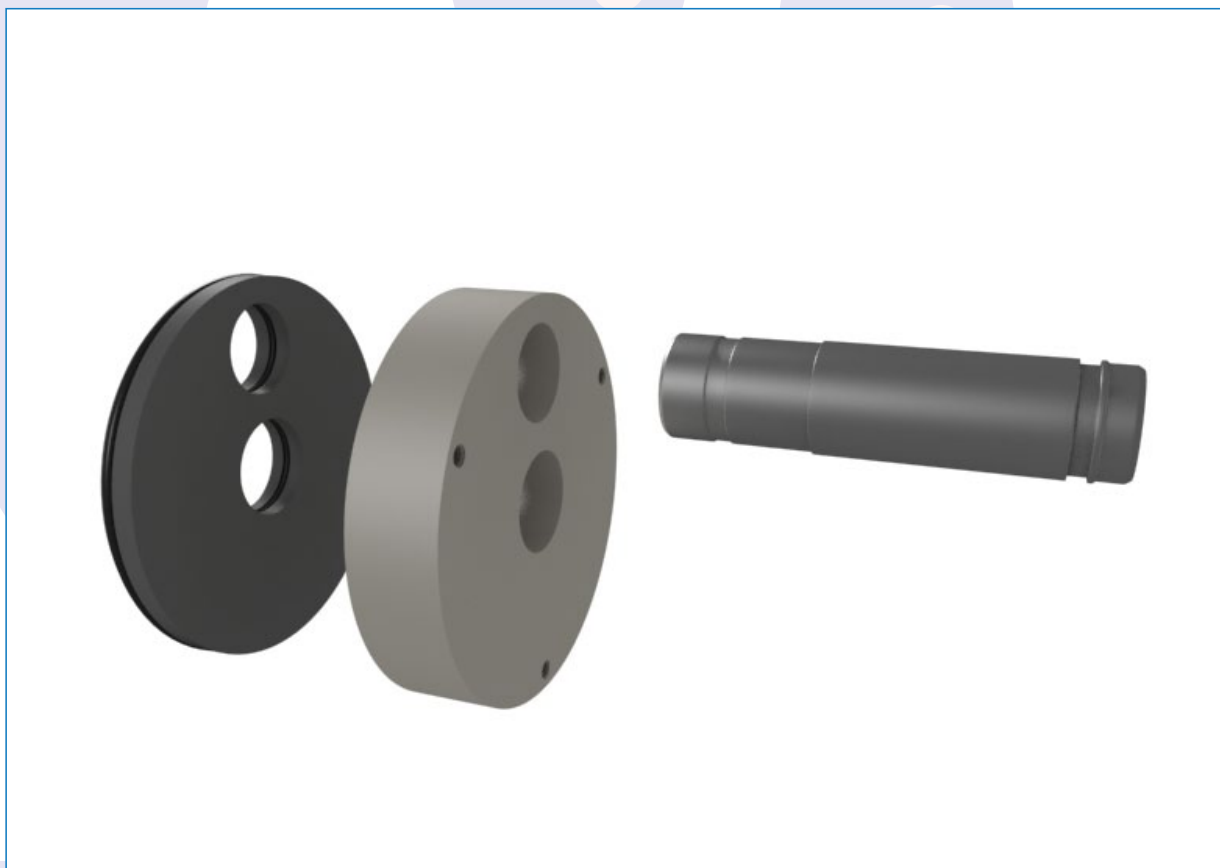
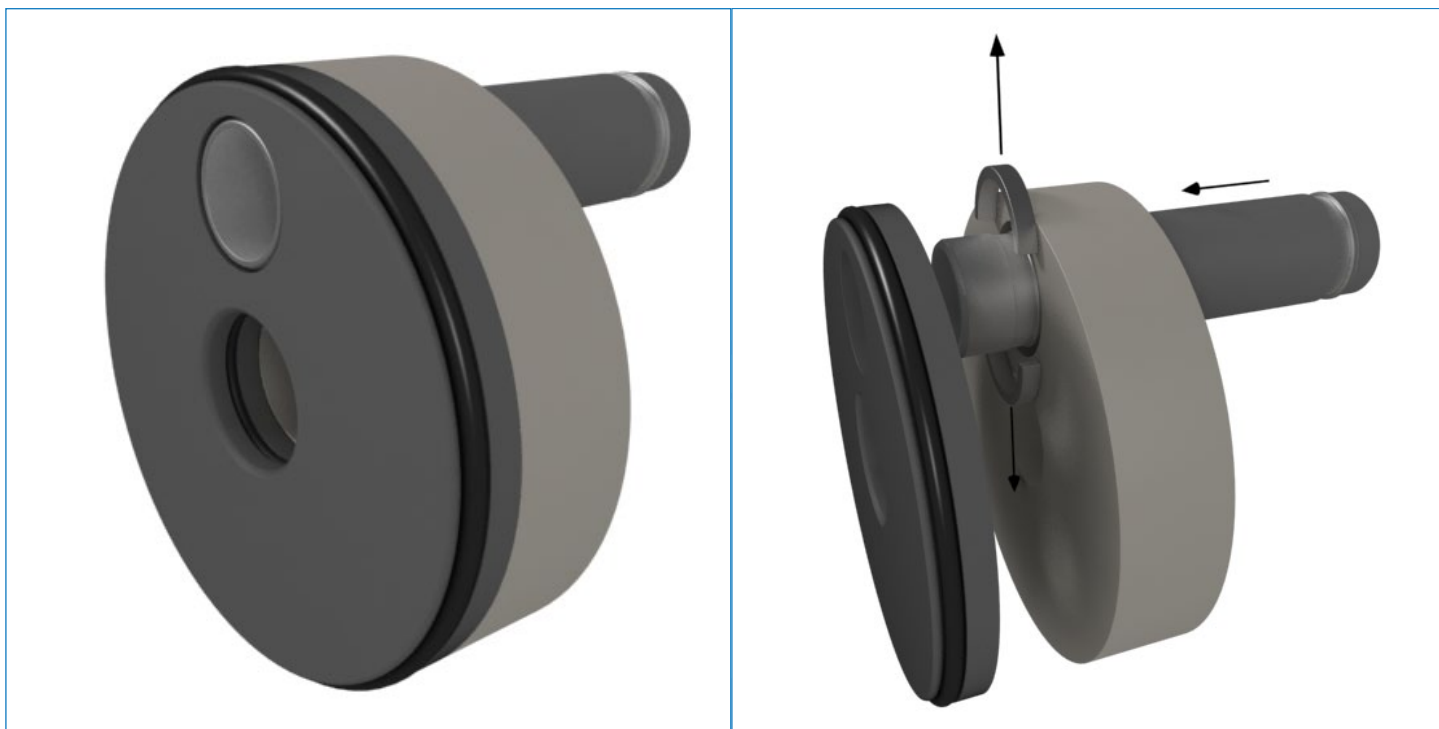


- 1.2.2 Push the product tube back into the end cap and at the same time pull out the black coloured collett at the other end of the product tube. The 5 to 10 mm gap should now appear on the other side of the end cap.



- 1.2.3 Using a small screwdriver prise open the collett by pushing the blade of the screwdriver into the gap. This should enable the product tube to release cleanly and preserve the threaded portion of it for re-use later.

1.2.4 Push the feed concentrate port forward so that the split retaining ring falls out. Remove the feed concentrate port from the end plate by pulling and twisting simultaneously.



## 1.3 COMPONENT ASSEMBLY

1.3.1 Thoroughly clean all parts and check for the following.

- (a) O-SEALS - cracked, worn or cut areas.
- (b) FEED CONCENTRATE PORT - bent or distorted.
- (c) BACKING PLATE - dented, anodising damaged or locating threads for cap head screws stripped.
- (d) SPLIT RETAINING RING - bent or distorted.
- (e) SEGMENTED RETAINING RING - bent or distorted.
- (f) CAP HEAD SCREWS - bent, corroded or threads damaged.
- (g) PRODUCT TUBE - threads damaged or sealing areas scratched.
- (h) END PLATE - cracks or scratches in sealing areas.
- (i) ADAPTOR - cracks or scratches in sealing areas.
- (j) ANTI-ROTATION COLLET - cracked or broken.
- (k) BACKNUT - cracked, broken or thread damaged.

Components which show any of the above should be replaced.

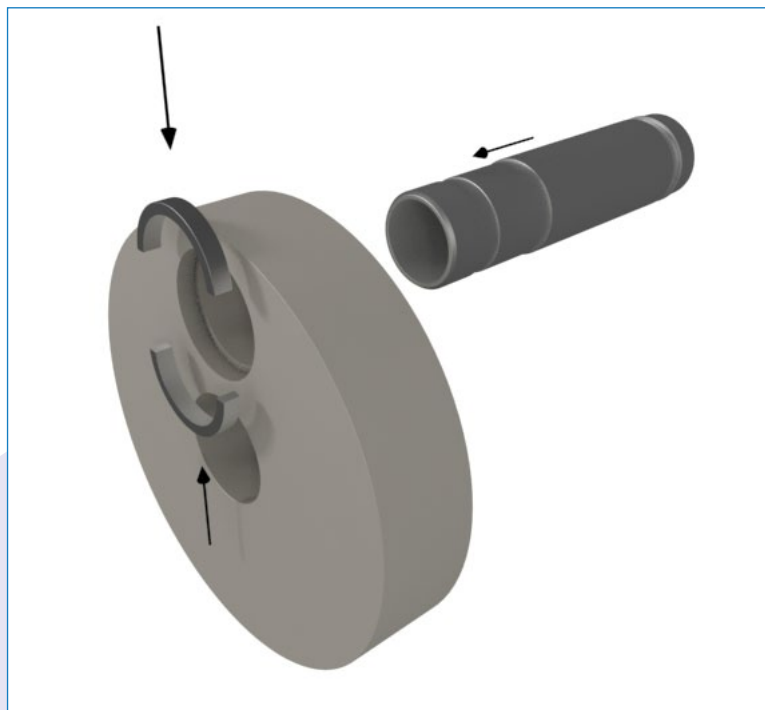
1.3.2. CORROSION - Examine metal components for evidence of corrosion which might affect structural performance. Particularly pay attention to the backing plate and segmented retaining ring set. The backing plate may be cleaned using fine grade waterproof silicone carbide paper (600 grade or finer). Components which cannot be restored to the 'as new' condition should be replaced.

**NOTE : It is recommended that O-seals are replaced every time the end cap is rebuilt.**

**NOTE : Damage to anodising may be temporarily repaired by sealing with epoxy paint.**



- 1.3.3 Push the feed concentrate port through the off centre hole in the backing plate. Fit the split retaining ring and pull the feed concentrate port so that the ring is located in the counterbore of the backing plate.

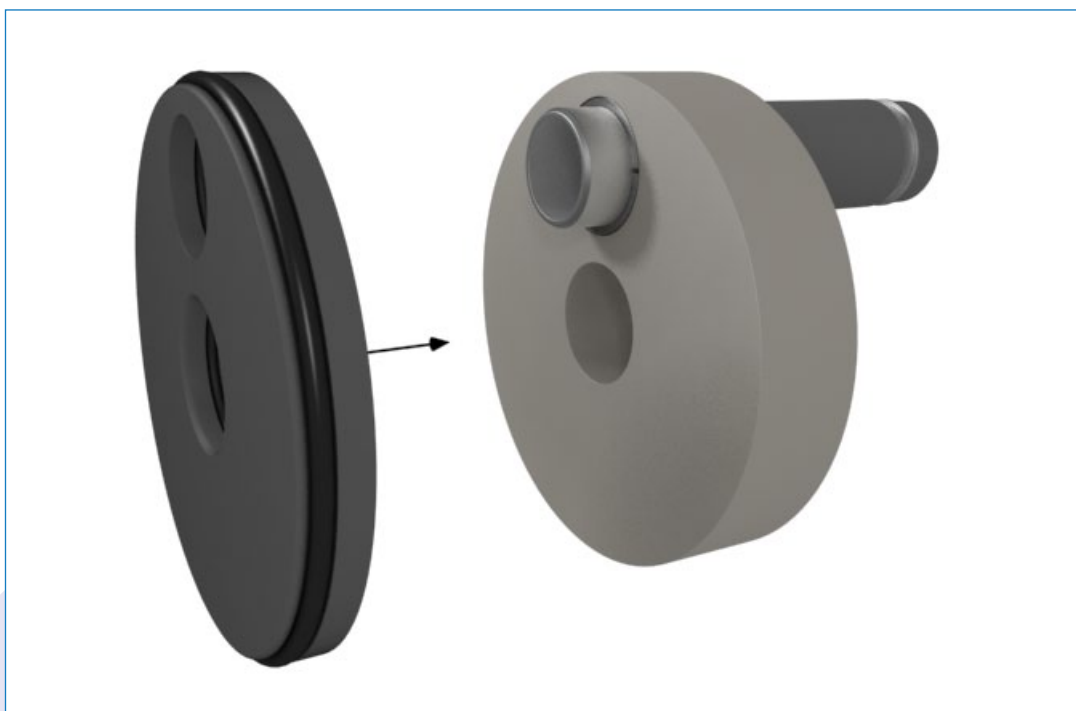


- 1.3.4 Assemble the UPVC end plate with its O-seals.

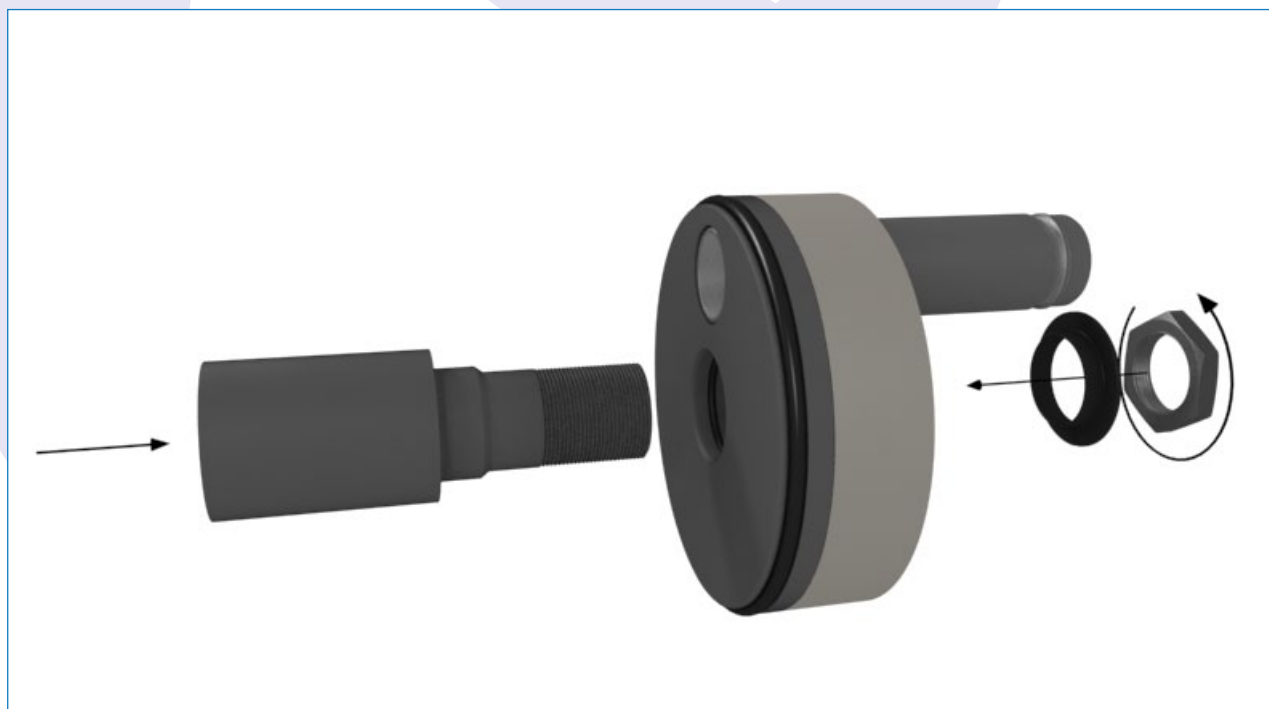


**NOTE: Lubricate the O-Seals with Glycerine. Do not use grease as this may impair the performance of the membrane elements.**

- 1.3.5 Fit the endplate over the feed concentrate port and push it fully home until it contacts the backing plate.



- 1.3.6 Push the product tube into the endplate. Fit the anti-rotation collet onto the threaded part of the product tube followed by the 1.5" BSP backnut. Tighten the backnut until the product tube is gripped tightly.



**NOTE :** Make sure that the chamfered edge of the endplate faces away from the backing plate and into the vessel.

## 1.4 LOADING MEMBRANES

**This Section is provided as a Guide only, reference should be made to the element manufacturers recommendations for loading.**

### 1.4.1 UNLOADING MEMBRANE ELEMENTS

- (a) Ensure system is NOT pressurised before starting work.
- (b) Remove both end caps from vessel.
- (c) Remove thrust ring and adaptors from vessel.
- (d) Remove element from vessel following element manufacturers recommendations.

### 1.4.2 CHECKS BEFORE LOADING

- (a) Check the inside of the vessel for debris which may scratch the vessel. Remove any that is found by flushing with water or by using a clean cloth. Stubborn debris which adheres to the vessel may be removed by lightly polishing the area with waterproof silicone carbide paper. Use 400 Grade (fine) to start with and finish with 600 Grade (very fine). It will help to moisten the grit paper with water during use. Avoid continuously rubbing the same spot in the same direction. Afterwards remove any debris with water or by using a clean cloth.
- (b) Check that there are no sharp edges to the membrane element which could scratch the vessel. Contact the element manufacturer if these cannot be easily removed.
- (c) Check the element brine seal for wear and or cuts. Consult the element manufacturer for spares and advice.

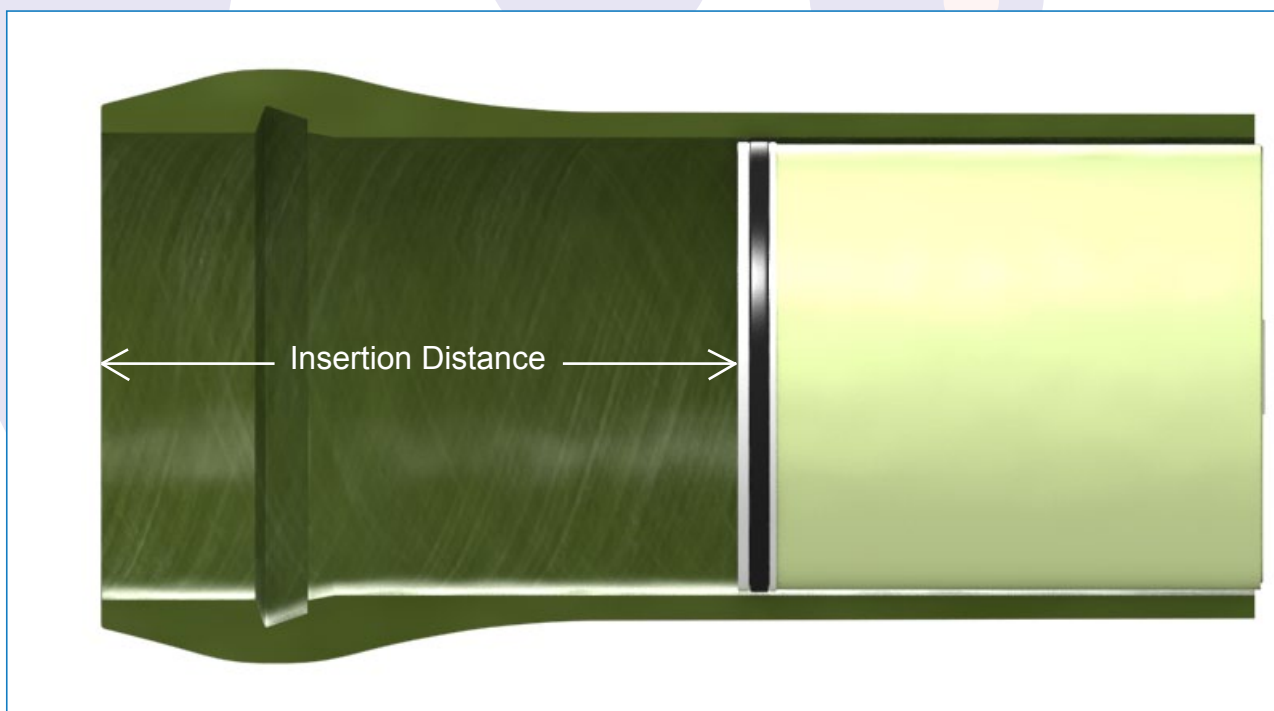
**NOTE:** Sharp debris may scratch vessel bore. This should be removed before unloading elements.

**NOTE:** Fine grade Scotchbrite may be substituted for waterproof silicone carbide paper.

### 1.4.3 LOADING MEMBRANE ELEMENTS

- (a) Lubricate the inside of the vessel with glycerine. If this is not available then flood vessel with clean water.
- (b) Check with the element manufacturer concerning the position of the brine seal. Normally this is placed on the upstream end of the element with the recessed part of the seal pointing upstream.
- (c) Push the elements into the vessel from the upstream end.
- (d) As each element is loaded insert the interconnector. To ease insertion glycerine should be applied to the O-seals.
- (e) Care should be taken to ensure that the weight of the element is not taken on the interconnectors during loading.
- (f) The final element should be inserted the following distances in from the end of the vessel.

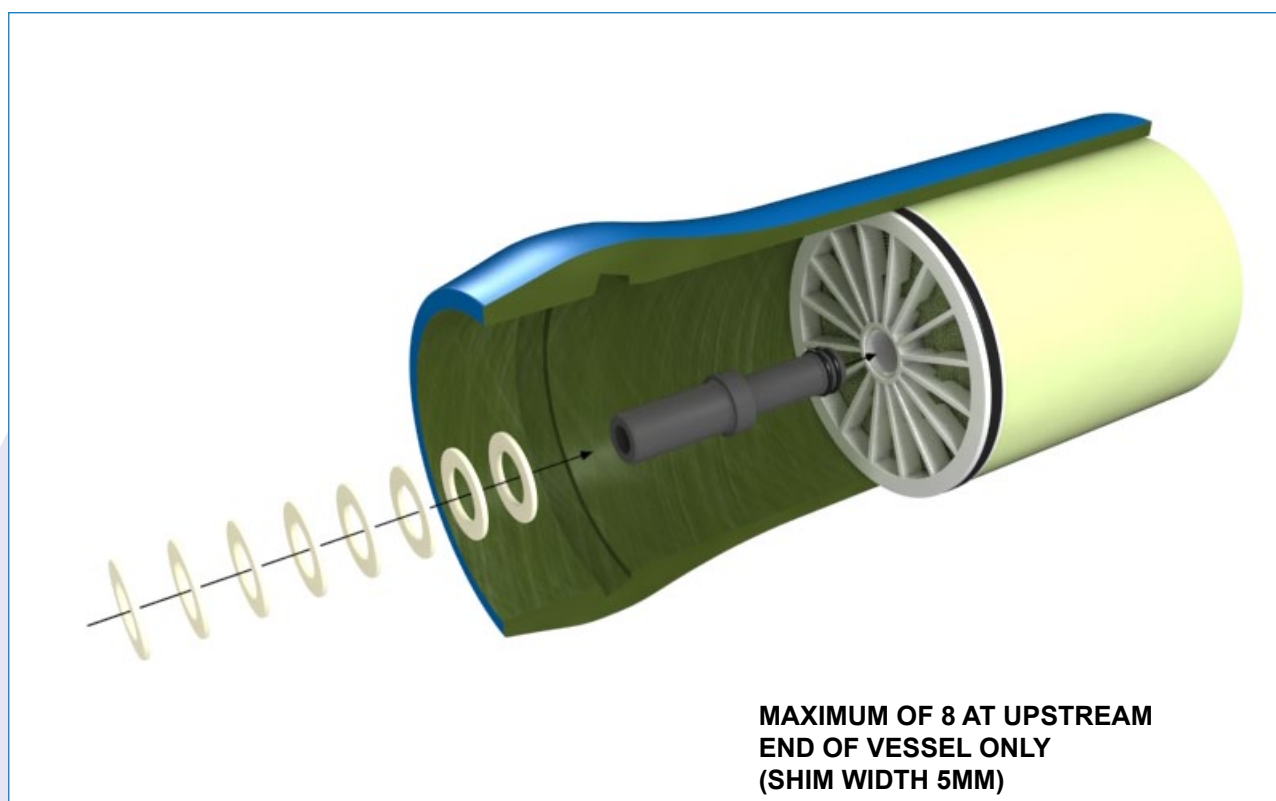
Vessel Type	Insertion Distance	
	MIN	MAX
8" 1200 psi End Port	12.0" (305 mm)	12.6" (321 mm)
8" 1000 psi End Port	11.0" (280 mm)	11.6" (296 mm)
8" 600 psi End Port	10.0" (254 mm)	10.8" (274 mm)
8" 400 psi End Port	9.6" (244 mm)	10.5" (267 mm)



- (g) If the elements are pushed too far then continue pushing until the first element emerges from the other end of the vessel. Take care to support its weight as it emerges.

(h) Fit the Adaptors provided with the vessel end cap to the core tube of the elements at both ends.

(i) If the element is of the spigotted type - i.e. has a core tube which is proud of the face of the element then Shims may be required to ensure that the element remains connected to the pressure vessel end fitting. These must be placed between the Adaptor and the Hub at the upstream end only - i.e. at the opposite end to the Thrust Ring.  
The Shim is a solid plastic washer: - OD 55mm; ID 33mm, by 5mm thick. A maximum of 8 at the upstream end of the vessel may be used.



**NOTE: Shims reduce wear on O-Seals by controlling the amount of free movement available to the element stack. They can be fitted on all element types.**

**NOTE: Adaptors must be fitted to both ends of the stack of elements. Catastrophic failure of the product line can occur if adaptors are not fitted and pressure is applied.**

The required number of shims may vary between any two vessels loaded with elements due to tolerance build up, each will require measuring to find the exact number. The ideal situation is to have a working float of 0.2" to 0.4" (5-10mm) at the upstream end of the vessel to allow for future thermal expansion and contraction. The best method of achieving this is to fit the maximum number of shims (8 at 0.2" thickness) and to keep subtracting shims one at a time until the retaining ring segments fit into the groove in the vessel. Finally subtract one more shim to ensure a safe float of 0.2"-0.4".

(J) Normally only one Thrust Ring is provided per vessel the correct location being at the downstream end of the vessel. The design of Adaptor and Thrust Ring ensures even loading over the face of the element.

Prior to July 1993 there were two designs of thrust ring with different lengths. After July 1993 the longer length thrust ring was phased out and the corresponding adaptors shortened. The longer length of thrust ring was supplied for 8" vessels with the following elements :

(1) Fluid Systems (2) Hydranautics (3) Dupont.

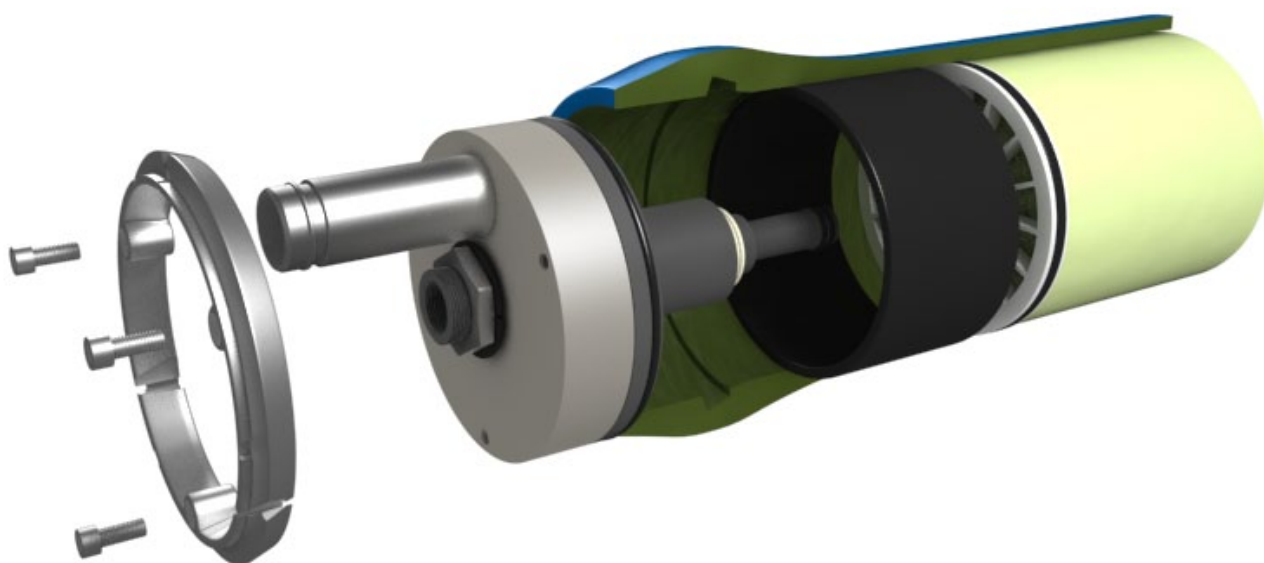


**NOTE :** If adaptors or thrust rings are being replaced check that the new parts are the same length as the old.

**NOTE :** Incorrect location of the thrust ring will damage the membrane elements.

## 1.5 CLOSING VESSEL

- 1.5.1 Check the inside of the vessel for debris which may scratch the vessel. Remove any that is found by flushing with water or by using a clean cloth. Stubborn debris which adheres to the vessel may be removed by lightly polishing the area with waterproof silicone carbide paper. Use 400 Grade (fine) to start with and finish with 600 Grade (very fine). It will help to moisten the grit paper with water during use. Avoid continuously rubbing the same spot in the same direction. Afterwards remove any debris with water or by using a clean cloth.
- 1.5.2 Lubricate the vessel inside surfaces with glycerine.
- 1.5.3 Lubricate the assembled end cap with glycerine, particularly the large 8" diameter O-seal.
- 1.5.4 Insert the end cap squarely into the vessel body sufficient to allow the segmented retaining rings to be inserted fully into the groove in the end of the vessel. If the end fitting is difficult to push into the vessel then use the wooden shaft of a hammer to tap it into position.



**NOTE :** Fine grade Scotchbrite may be substituted for waterproof silicone carbide paper.

**NOTE :** Do not use excessive force to insert the end cap. A light tap is sufficient.

If the end cap cannot be easily inserted then the following checks should be carried out.

(i) Lubricate vessel surfaces with more glycerine and try again.

(ii) The elements may have been pushed too far, proceed as follows:

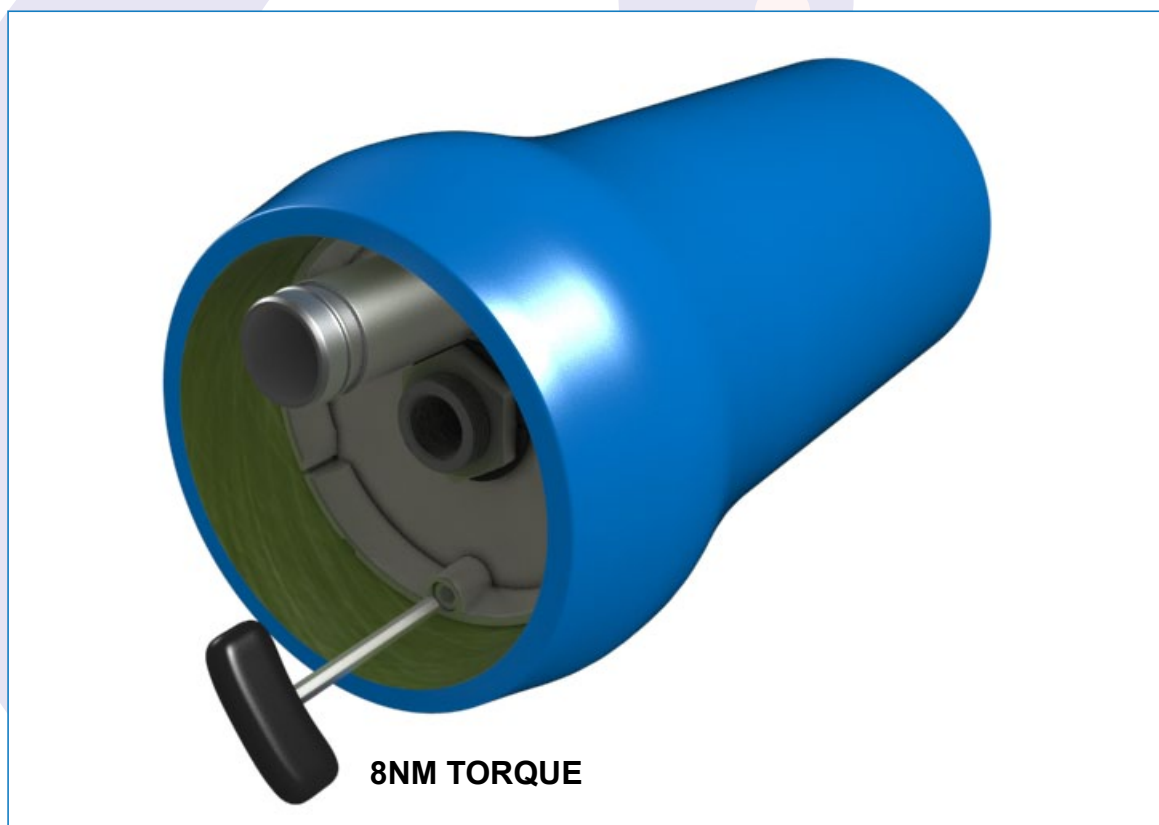
Remove large 8" diameter seal from end cap.

Remove adaptor from element.

Remove small external O-seal from adaptor and insert into end cap.

(iii) Without the O seals no effort should be required to insert the end cap, if there is still insufficient space to insert the retaining rings then the elements have been pushed too far during loading. Remove the last element by pushing it through the vessel taking care to support its weight as it emerges. Refer to Section 1.4 'Loading Membrane Elements' for further information.

1.5.5. With the end fitting in place insert one of the three segmented retaining rings and fix with one of the three caphead screws. Do not tighten the caphead screw but leave loose as this will make for easier location of the remaining segmented rings. Put both of the remaining segmented rings into position before inserting the remaining cap head screws. Finally tighten all caphead screws handtight upto a maximum torque of 8Nm.



**NOTE :** Remember to refit all O-seals, thrust ring and insert adaptors into the central core tube of the first and last element in the stack.

**NOTE :** A partially or badly assembled pressure vessel is dangerous. Carry out visual inspection on vessel to check compliance with these instructions. Check working area for any items left unassembled.



## SECTION TWO

### INSTALLATION

#### 2.1 HANDLING

2.1.1 Vessels may be stored horizontally in any warehouse where the temperatures are as follows:

Maximum 45° C (113° F)

Minimum 0° C ( 32° F)

2.1.2 DO NOT subject the vessel to sharp blows or impacts as this may damage the vessel wall.

2.1.3 DO NOT use the ports which project beyond the vessel as lifting or manoeuvring aids.

2.1.4 DO NOT scratch the vessel inside wall.

2.1.5 Slings wrapped around the vessel wall and suspended from the forks of a fork lift truck are safer and more stable than using forks alone.

2.1.6 Forks should always be padded before being brought into contact with any part of the vessel body.

#### **VESSEL DAMAGE**

This should be reported to the shipping company and Phoenix Vessel Technology Limited.

## 2.2 VESSEL SUPPORT POSITION

The bending stresses generated in a long pressure vessel can be considerable and should not be ignored. Careful choice of support position can minimise bending stresses to an acceptably low level. Always follow instructions stated on the Assembly Drawing for each particular vessel design and length ordered.

No. of 40" Elements	No. of Supports	Distance rtween Supports (mm)		Distance between Outer Supports (mm)	
		Max	Min	Max.	Min.
1	2	875	500		
1.5	2	1400	500		
2	2	1890	500		
3	2	2910	960		
4	2	3190	1970		
4.5	2	3375	2480		
5	3	centre support		3560	2990
6	3			4020	3800
7	3			6170	5090
7.5	3			6220	5330

## 2.3 CONNECTIONS TO VESSEL

- 2.3.1 Mount vessels using support saddles provided on horizontal surface at the recommended support position and tighten straps to eliminate movement, do not tighten to more than drawing recommended torque.
- 2.3.2. Provide pressure relief device. This should be set to no more than 105% of design pressure.
- 2.3.3. Allow for an expansion of 0.5mm per metre length of vessel at design pressure.
- 2.3.4. Victaulic clamps used for connection to vessel should be assembled tightly with bolt pads of clamp halves metal to metal.

**NOTE : Excessive torque applied to the straps may damage the vessel wall and cause the strap nut to seize onto the threaded portion.**

## SECTION THREE OPERATION

### 3.1 CORROSION

- Operational pH level 3 - 10
- Cleaning only pH level 2 - 12 for no longer than 30 mins. Immediately clean down & purge.

Whilst every effort has been taken to ensure that end fittings have adequate corrosion resistance it is the responsibility of the purchaser to assess that the materials offered are suitable for the specific corrosion environment.

Alternate materials are available with enhanced corrosion resistance, contact Phoenix Vessel Technology Limited for advice.

End fittings should be maintained dry and free from corrosion. Vessel leaks should be investigated and corrected.

## 3.2 OPERATING CONDITIONS

### DESIGN SPECIFICATION

Internal Diameter:	To fit any 8" nominal diameter element.
Length:	Up to 300" of membrane elements.
Working Fluid:	Water (brackish or seawater).
Design Pressure:	400 psi (27.6 bar). 600 psi (41.4 bar). 1000 psi (69.0 bar). 1200 psi (82.8 bar).
Test Pressure:	1.1 times design pressure for upto 15 minutes maximum.
Design Temperature:	20 to 113 <sup>0</sup> F (-7 to 45 <sup>0</sup> C).
Expansion:	0.5 to 0.6 mm per metre length of vessel at design pressure.
Vacuum condition:	Down to -14.5 psi (0 bar absolute).
Support Position:	2 supports for 1 to 4.5 (40") elements. 3 supports for 5 to 7.5 (40") elements and any length supported outside of the recommended support range ( refer to 'Vessel Support Position' Section 2.2 this User`s Guide).

**NOTE :** The standard materials of construction may not be compatible with cleaning and preserving fluids. Alternative materials are available on request.

**NOTE :** The product tube must not be subjected to a pressure greater than 125 psi (8.6 bar) at 113 deg F (45 C).

**NOTE :** The vessel should not be allowed to freeze solid. This will damage the vessel wall and make replacement necessary.

## 3.3 SAFETY PRECAUTIONS

Fibreglass reinforced pressure vessels will provide years of safe service if properly installed and maintained. This section is for guidance only and should be used in conjunction with the recommendations in the previous sections. Attention is drawn to the 'NOTES:' located at the bottom of the page which highlight potential problems areas and safety recommendations.

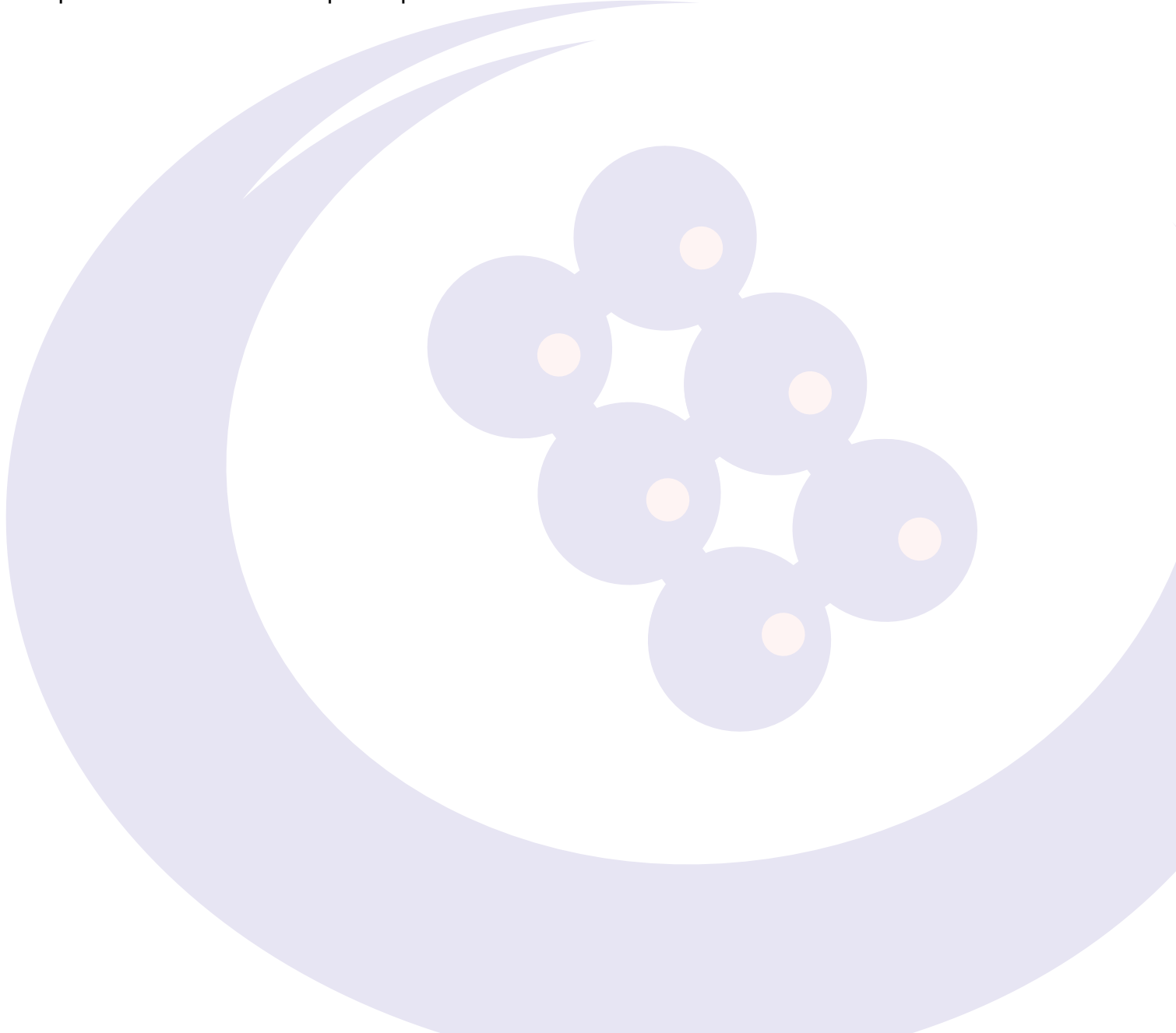
- 3.3.1 Provide pressure relief device. This should be set to no more than 105% of design pressure.
- 3.3.2 Before pressurisation visually check that the segmented retaining rings are in position and secured by the three cap head screws and that the backnut is fitted and is screwed up tightly.
- 3.3.3 DO NOT stand in line of end fitting while pressurisation takes place.

## SECTION FOUR

### APPENDIX

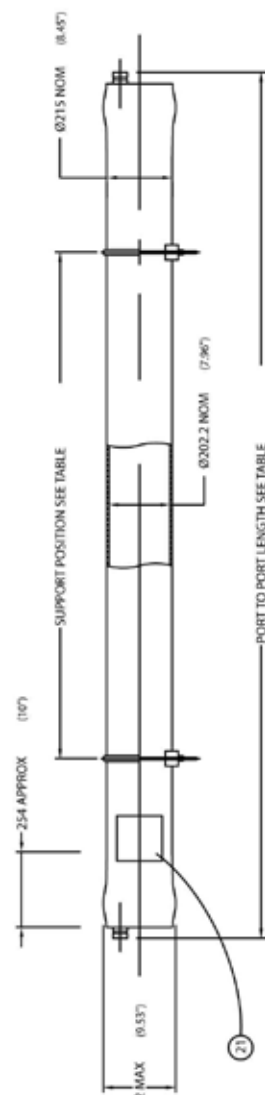
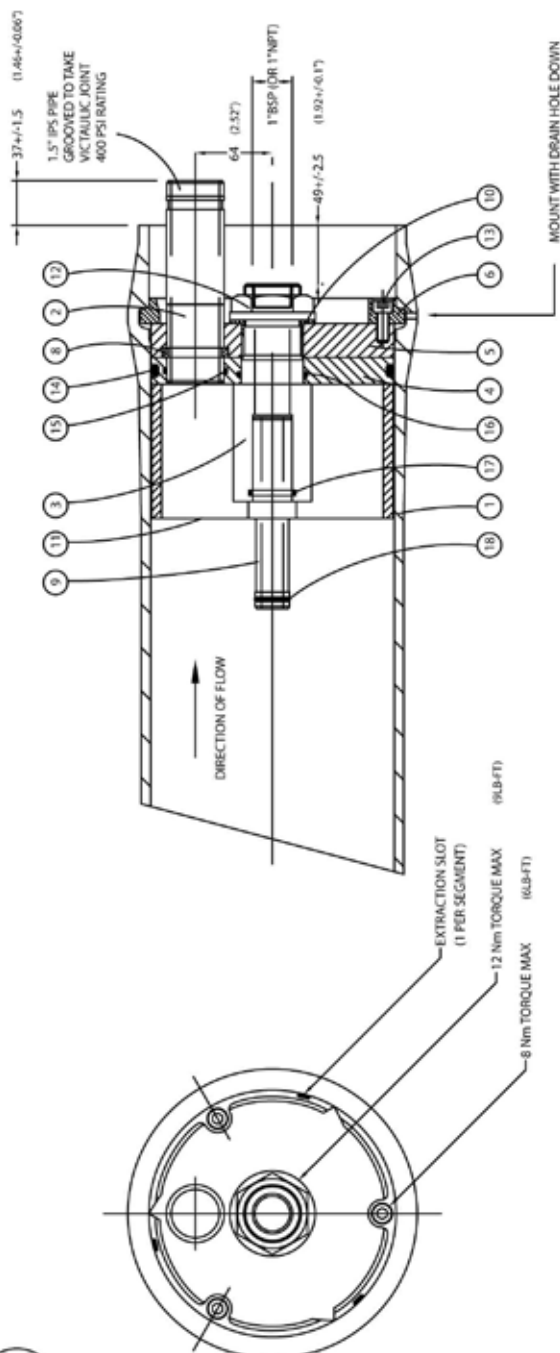
#### 4.1 SPARE PARTS LIST

For part numbers and descriptions please refer to the relevant Technical Information Sheet.



## NOTES :

1. GLYCERINE TO BE USED ON 'O' SEAL PATHS TO REDUCE FRICTION.
2. TIGHTEN ALL CONNECTIONS TO 50% OF MAX TORQUE FIGURE PROVIDED. DO NOT EXCEED MAX TORQUE FIGURE.
3. REFER TO USERS GUIDE FOR MORE DETAILED INFORMATION ON MAINTENANCE, INSTALLATION, OPERATION AND SPARES.
4. EACH VESSEL TESTED TO ENSURE NO LEAKS 1.1 OR 1.5 TIMES DESIGN PRESSURE FOR 1 MINUTE, 1.0 TIMES DESIGN PRESSURE FOR 15 MINUTES.
5. DESIGN PRESSURE 400 PSI  
DESIGN TEMPERATURE -7 TO 45 C.  
DO NOT ALLOW VESSEL CONTENTS TO FREEZE.
6. DO NOT ALLOW PERMEATE PRESSURE TO EXCEED 125 PSI AT 45 C.
7. IF VESSEL SUPPORTS ARE OUTSIDE OF THE RANGE AS RECOMMENDED IN THE TABLE BELOW USE ADDITIONAL SUPPORTS.
8. VESSEL SUPPLIED WITH DRAIN HOLE. MOUNT WITH DRAIN HOLE DOWN.



21	NAME/PLATE	ALUMINIUM OR VINYL	1
20	SADDLE	URETHANE	2/3
19	STRAP	STAINLESS STEEL /PVC	2/3
18	'O' SEAL ADAPTOR	EPDM	2
17	'O' SEAL PROD/ADAPTOR	EPDM	2
16	'O' SEAL PROD/ENDPLATE	EPDM	2
15	'O' SEAL FEED PORT	EPDM	2
14	'O' SEAL ENDPLATE	EPDM	2
13	CAP HEAD SCREW	CMF 15.20	6
12	1.5" BSP BACKNUT	UPVC	2
11	THRUST RING	2MNC 1979 IBS B	1
10	ANTI-ROTATION COLLET	ABS	2
9	ADAPTOR	3MNC 1894 IBS C	2
8	RETAINING RING (PORT)	UPVC	2
7		ST.ST. 316	2
6	RETAINING RING	ST.ST. 316	2
5	BACKING PLATE	2MNC 1469 SH1 IBSB	2
4	END PLATE	2MNC 1636 IBS G	2
3	PRODUCT TUBE	2MNC 1397 IBS G	2
2	FEED CONCENTRATE PORT	2MNC 3366 IBS A (BSP)	2
1	VESSEL BODY	2MNC 1915 IBS1 (NPT)	2
		2MNC 1183 IBS G	2
		2MNC 1221 IBS S	1

NO. OF 40\"/>
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## DESIGN CODE ASME X

8\"/&gt;

1MNC 1615

SCALE : NONE

DIMENSIONS : MILLIMETRES

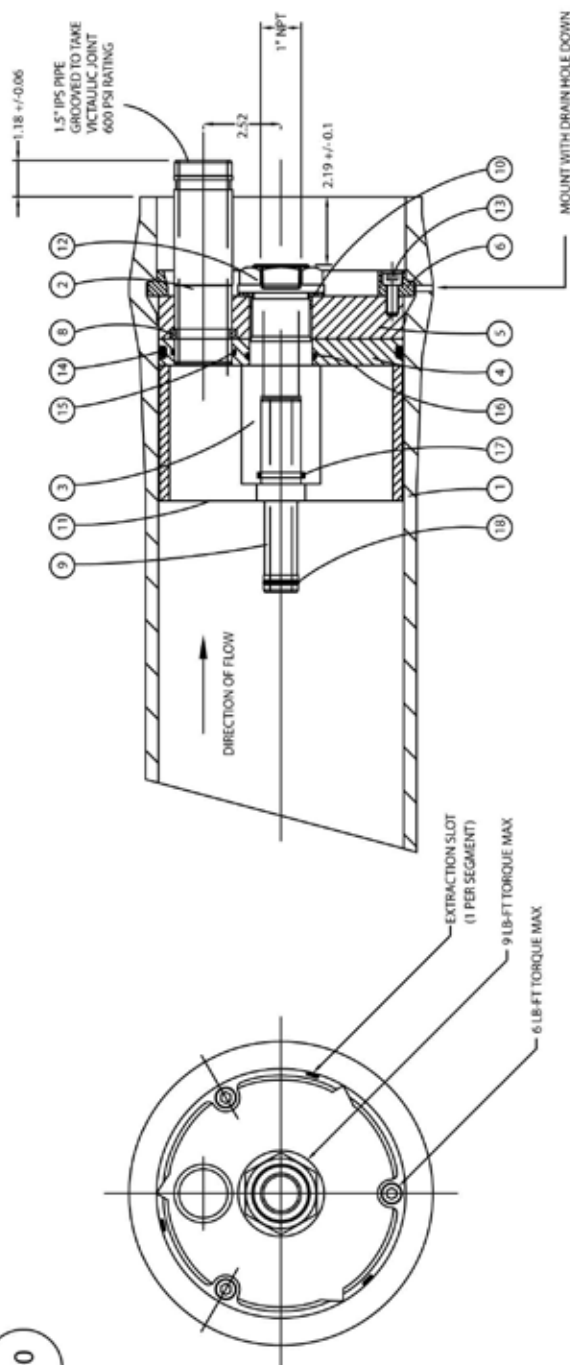
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## NOTES :

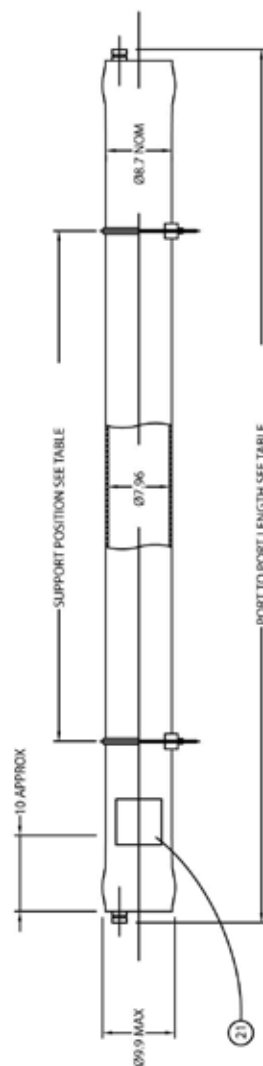
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4. EACH VESSEL TESTED TO ENSURE NO LEAKS  
1.1 OR 1.5 TIMES DESIGN PRESSURE FOR 1 MINUTE  
1.0 TIMES DESIGN PRESSURE FOR 15 MINUTES.
5. DESIGN PRESSURE: 600 PSI  
DESIGN TEMPERATURE: -7 TO 45 C.  
DO NOT ALLOW VESSEL CONTENTS TO FREEZE.
6. DO NOT ALLOW PERMEATE PRESSURE TO EXCEED 125 PSI AT 45 C.
7. IF VESSEL SUPPORTS ARE OUTSIDE OF THE RANGE AS RECOMMENDED IN THE TABLE BELOW USE ADDITIONAL SUPPORTS.
8. VESSEL SUPPLIED WITH DRAIN HOLE. MOUNT WITH DRAIN HOLE DOWN.

EXTRACTION SLOT  
(1 PER SEGMENT)

9 LB-FT TORQUE MAX

6 LB-FT TORQUE MAX

MOUNT WITH DRAIN HOLE DOWN



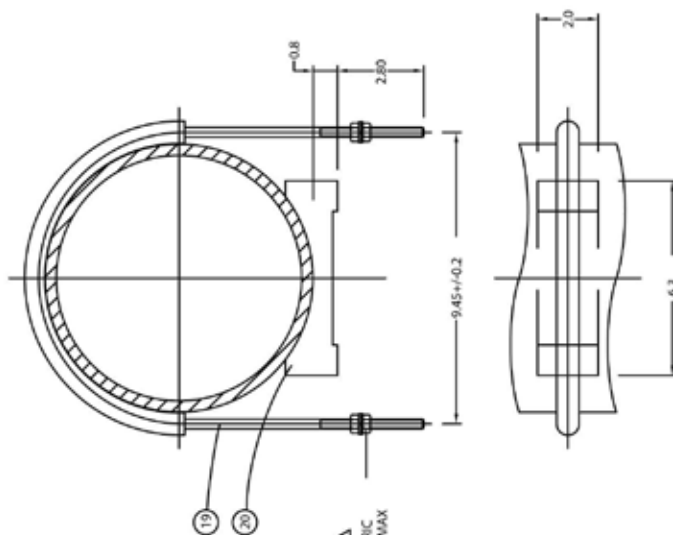
10 APPROX

SUPPORT POSITION SEE TABLE

PORT TO PORT LENGTH SEE TABLE

⚠

M8 X 1.25 METRIC,  
7.5 LB-FT TORQUE MAX



NO. OF 40° ELEMENTS	PORT TO PORT LENGTH (IN)	MAX SUPPORT POSITION (IN)	MIN SUPPORT POSITION (IN)	MAX DRY WEIGHT (LB)
1	63 ±0.3	34.4	19.7	86
1.5	83	55.1	19.7	103
2	103	74.4	19.7	120
3	143	114.6	37.8	150
4	183	125.6	77.6	182
4.5	203	132.9	97.6	198
5	223	140.2	117.7	214
6	263	158.3	158.3	246
7	303	242.9 C	200.4 C	278
7.5	323	244.9	209.8 C	293

C-CENTRAL  
SUPPORT REQD

## DESIGN CODE ASME X

8" PRESSURE VESSEL 600 PSI, END PORT.

21	NAMEPLATE	ALUMINUM OR VINYL	PVL-1075	1
20	SADDLE	URETHANE	PVL-3426	2/3
19	STRAP (U-BOLT)	STAINLESS STEEL / PVC	PVL-3426	2/3
18	'O' SEAL ADAPTOR	NITRILE WRC LISTED	TO SUIT MEMBRANE	2
17	'O' SEAL PROCD/ADAPTOR	NITRILE WRC LISTED	SIZE BS 219	2
16	'O' SEAL PROCD/ENDPLATE	NITRILE WRC LISTED	SIZE BS 832	2
15	'O' SEAL FEED PORT	NITRILE WRC LISTED	SIZE BS 225	2
14	'O' SEAL ENDPLATE	NITRILE WRC LISTED	SIZE BS 882	2
13	CAP HEAD SCREW	ST. STEEL GRADE A4	PVL-1520	6
12	1.5" BSP BACKNUT	UPVC	PVL-1979	2
11	THRUST RING	MDPE OR UPVC	PVL-1228	1
10	ANTI-ROTATION COLLET	ABS	PVL-1894	2
9	ADAPTOR	UPVC	TO SUIT MEMBRANE	2
8	RETAINING RING (PORT)	ST. ST. 316	PVL-1176	2
7				2
6	RETAINING RING	ST. ST. 316	PVL-1469	2
5	BACKING PLATE	ANODISED ALUMINUM 6061 T6	PVL-1635	2
4	END PLATE	UPVC	PVL-1907	2
3	PRODUCT TUBE	UPVC	PVL-1915	2
2	FEED CONCENTRATE PORT	ST. ST. 316L	PVL-1183	2
1	VESSEL BODY	GLASS FIBRE EPOXY RESIN	PVL-1220	1

1MNC 1614

SCALE: NONE  
DIMENSIONS: INCHES

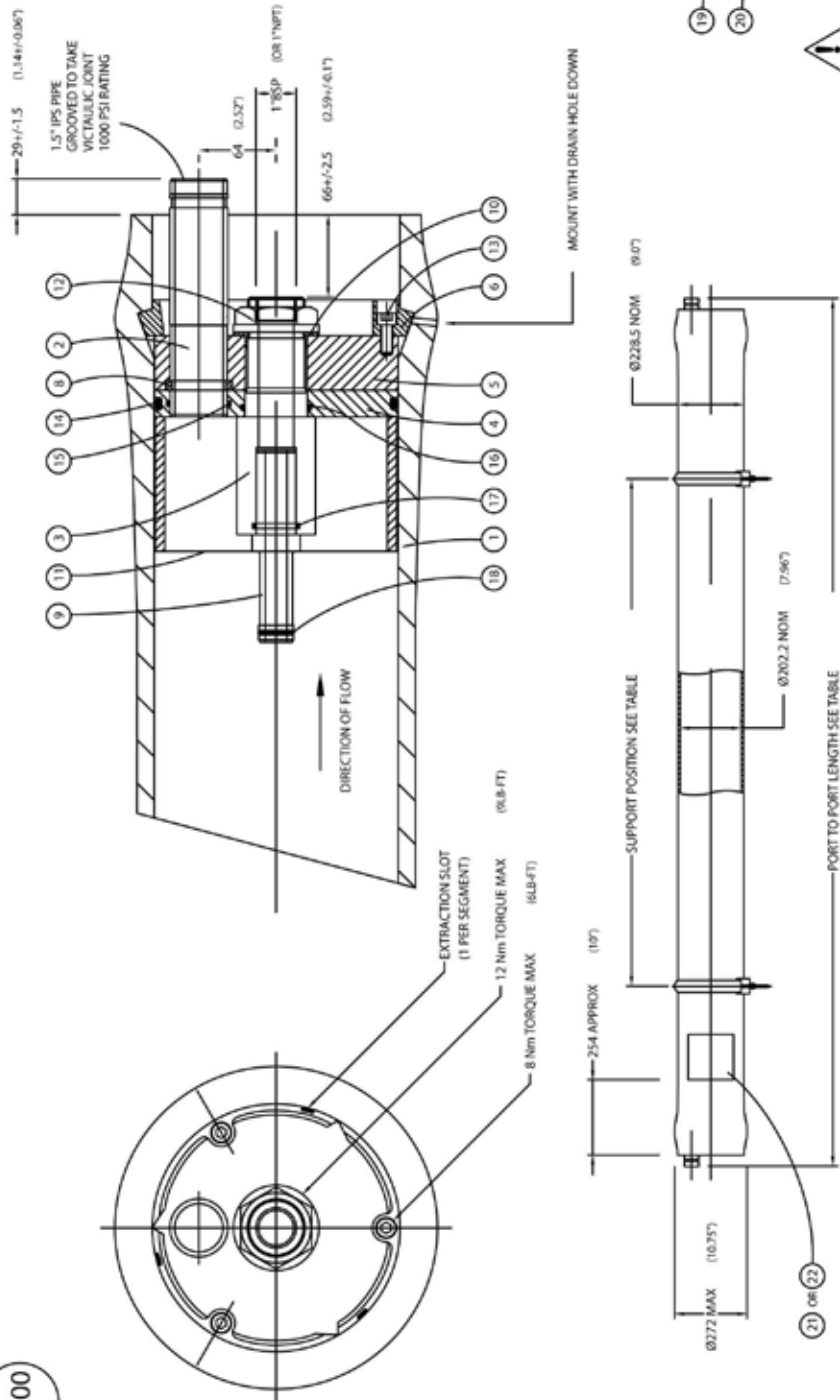
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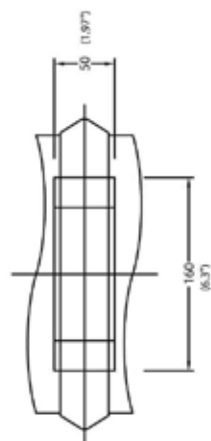
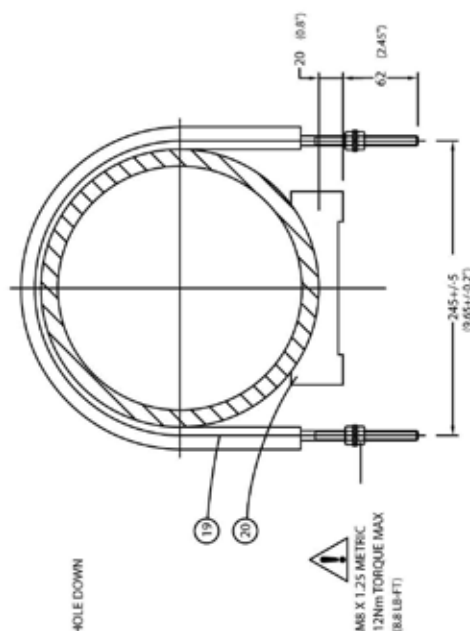
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## NOTES:

1. GLYCERINE TO BE USED ON 'O' SEAL PATHS TO REDUCE FRICTION.
2. TIGHTEN ALL CONNECTIONS TO 50% OF MAX TORQUE FIGURE PROVIDED. DO NOT EXCEED MAX TORQUE FIGURE.
3. REFER TO USERS GUIDE FOR MORE DETAILED INFORMATION ON MAINTENANCE, INSTALLATION, OPERATION AND SPARES.
4. EACH VESSEL TESTED AT:
  - 1.1 TIMES DESIGN PRESSURE FOR 1 MINUTE.
  - 1.0 TIMES DESIGN PRESSURE FOR 15 MINUTES.
5. DESIGN PRESSURE 1000 PSI  
DESIGN TEMPERATURE -7 TO 45 C.  
DO NOT ALLOW VESSEL CONTENTS TO FREEZE.
6. DO NOT ALLOW PERMEATE PRESSURE TO EXCEED 125 PSI AT 45 C.
7. IF VESSEL SUPPORTS ARE OUTSIDE OF THE RANGE AS RECOMMENDED IN THE TABLE BELOW USE ADDITIONAL SUPPORTS.
8. VESSEL SUPPLIED WITH DRAIN HOLE. MOUNT WITH DRAIN HOLE DOWN.

C-CENTRAL  
SUPPORT REQD

NO. OF 40° ELEMENTS	PORT TO PORT LENGTH +/- 7MM	MAX SUPPORT POSITION MM	MIN SUPPORT POSITION MM	MAX DRY WEIGHT KG
1	1651 (65)	875 (34)	500 (20)	55 (1220)
1.5	2159 (85)	1400 (55)	500 (20)	65 (1440)
2	2667 (105)	1890 (74)	500 (20)	75 (1650)
3	3683 (145)	2910 (115)	500 (20)	95 (2090)
4	4699 (185)	3190 (126)	1970 (78)	114 (2510)
4.5	5207 (205)	3375 (133)	2480 (98)	124 (2730)
5	5715 (225)	3560 (140)	2990 (118)	134 (2930)
6	6731 (265)	4020 (158)	4020 (158)	153 (3370)
7	7747 (305)	6170C (243)	5090C (207)	173 (3800)
7.5	8255 (325)	6220C (245)	5330C (210)	183 (4040)

## DESIGN CODE ASME X

EDITION ---  
APPENDIX ---

8" PRESSURE VESSEL 1000 PSI, END PORT.

22	NAMEPLATE (CODE)	ALUMINIUM	3MNC 1149 ISS V	1/0
21	LABEL	VINYL		1
20	SADDLE	POLYPROPYLENE	3920	2/3
19	STRAP	STAINLESS STEEL / PVC	2MNC 3426 ISS B	2/3
18	'O' SEAL ADAPTOR	EPDM	TO SUIT MEMBRANE	2/4
17	'O' SEAL PRO/DI ADAPTOR	EPDM	SIZE RS 219	2
16	'O' SEAL PRO/DI ADAPTOR	EPDM	SIZE RS 332	2
15	'O' SEAL FEED PORT	EPDM	SIZE RS 225	2
14	'O' SEAL END PLATE	EPDM	SIZE RS 882	2
13	CAP HEAD SCREW	ST STEEL GRADE A4	CMP 1520	6
12	1.5" BSP BACKNUT	UPVC	3MNC 1929 ISS B	2
11	THRUST RING	MDPE OR UPVC	2MNC 1228 ISS E	1
10	ANTI-ROTATION COLLET	ABS	3MNC 1894 ISS C	2
9	SPACER SHIMS*	ABS	3MNC 1674 ISS B	8
8	ADAPTOR	THERMOPLASTIC	TO SUIT MEMBRANE	2
7	RETAINING RING (PORT)	ST/ST 316	3MNC 1176 ISS F	2
6	RETAINING RING	ST/ST 316	2MNC 1470 SH1 ISS E	2
5	BACKING PLATE	ANCHORED ALUMINIUM 6061-T6	2MNC 1768 ISS G	2
4	END PLATE	UPVC	2MNC 1397 ISS G	2
3	PRODUCT TUBE	UPVC	2MNC 3369 ISS A (BSP)	2
2	FEED CONCENTRATE PORT	DUPLEX ST. ST. 2507	2MNC 1167 ISS J	2
1	VESSEL BODY	GLASS FIBRE EPOXY RESIN	2MNC 1219 ISS V	1

1MNC 1381

SCALE: NONE  
DIMENSIONS: MILLIMETRES

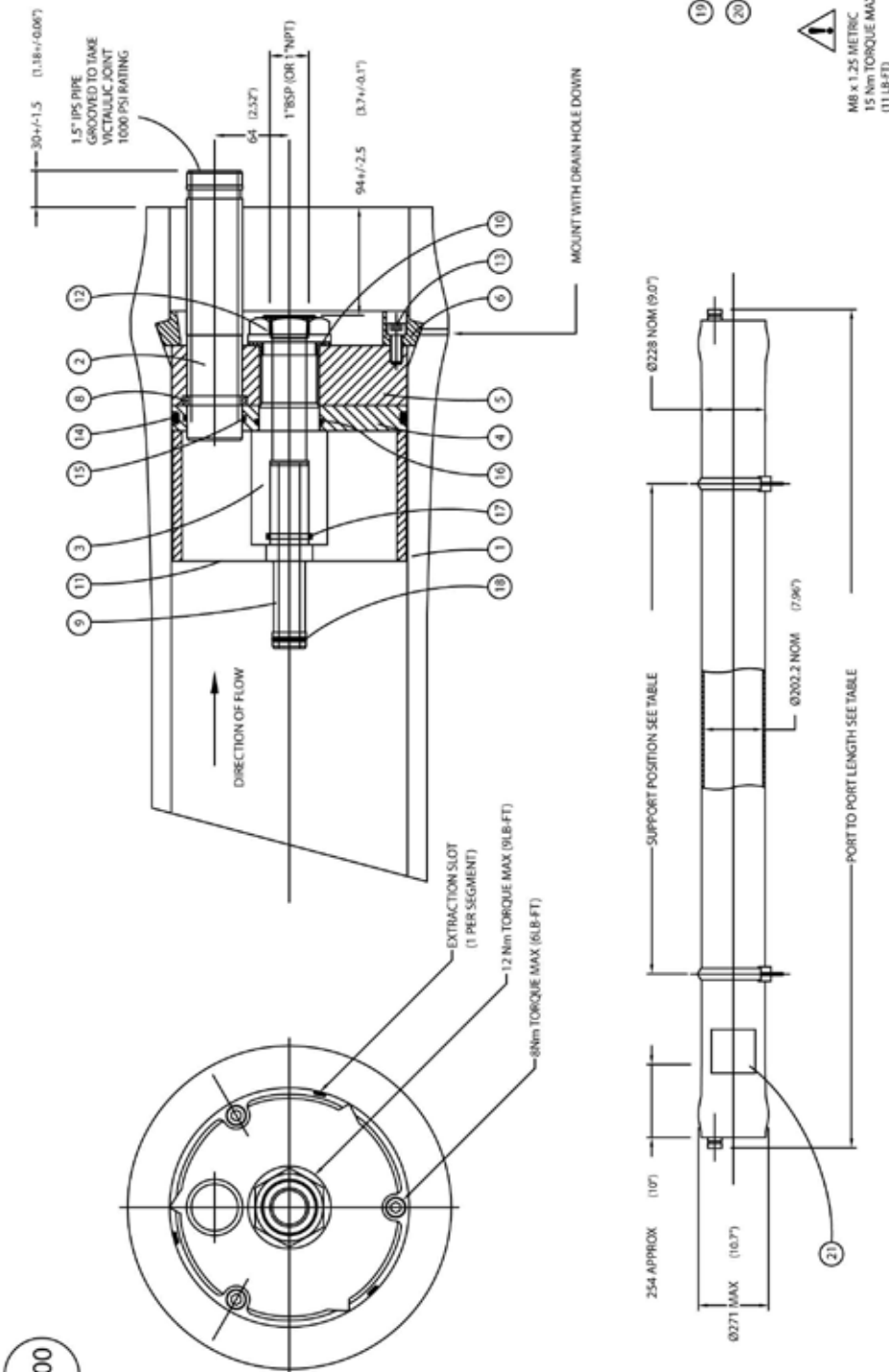
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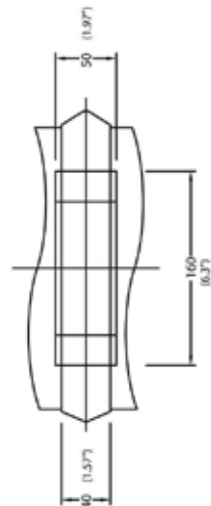
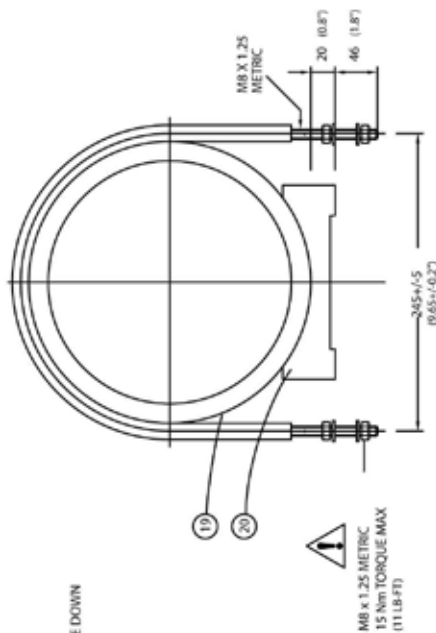
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## NOTES :

1. GLYCERINE TO BE USED ON 'O' SEAL PATHS TO REDUCE FRICTION.
2. TIGHTEN ALL CONNECTIONS TO 50% OF MAX TORQUE FIGURE PROVIDED. DO NOT EXCEED MAX TORQUE FIGURE.
3. REFER TO USER'S GUIDE FOR MORE DETAILED INFORMATION ON MAINTENANCE, INSTALLATION, OPERATION AND SPARES.
4. EACH VESSEL TESTED TO ENSURE NO LEAKS AT:  
1.1 TIMES DESIGN PRESSURE FOR 1 MINUTE  
1.0 TIMES DESIGN PRESSURE FOR 15 MINUTES
5. DESIGN PRESSURE: 1200 PSI  
DESIGN TEMPERATURE: -7 TO 45 C.  
DO NOT ALLOW VESSEL CONTENTS TO FREEZE.
6. DO NOT ALLOW PERMEATE PRESSURE TO EXCEED 125 PSI AT 45 C.
7. IF VESSEL SUPPORTS ARE OUTSIDE OF THE RANGE AS RECOMMENDED IN THE TABLE BELOW USE ADDITIONAL SUPPORTS.
8. VESSEL SUPPLIED WITH DRAIN HOLE. MOUNT WITH DRAIN HOLE DOWN.

C-CENTRAL  
SUPPORT REQD

NO. OF 40° ELEMENTS	PORT TO PORT LENGTH +/-7MM	MAX SUPPORT POSITION MM	MIN SUPPORT POSITION MM	MAX DRY WEIGHT KG
1	1702 (67)	875 (34)	500 (20)	61 (134lb)
1.5	2210 (87)	1400 (55)	500 (20)	73 (160lb)
2	2718 (107)	1890 (74)	500 (20)	85 (186lb)
3	3734 (147)	2910 (115)	960 (38)	108 (238lb)
4	4750 (187)	3190 (126)	1970 (78)	114 (250lb)
4.5	5258 (207)	3375 (133)	2480 (98)	124 (274lb)
5	5766 (227)	3560 (140)	2990 (118)	134 (295lb)
6	6782 (267)	4020 (158)	4020 (158)	153 (338lb)
7	7798 (307)	6170C (243)	5090C (200)	173 (381lb)
7.5	8306 (327)	6220C (245)	5330C (219)	183 (403lb)

## DESIGN CODE ASME X

8" PRESSURE VESSEL 1200 PSI, END PORT.

21	NAMEPLATE	ALUMINUM OR VINYL	1
20	SADDLE	URETHANE	2/3
19	STRAP	STAINLESS STEEL/NEOPRENE	2/3
18	'O' SEAL ADAPTOR	EPDM	2
17	'O' SEAL PRODUCE ADAPTOR	EPDM	2
16	'O' SEAL PRODUCE PLATE	EPDM	2
15	'O' SEAL FEED PORT	EPDM	2
14	'O' SEAL ENDPLATE	EPDM	2
13	CAP HEAD SCREW	ST. STEEL GRADE A4	6
12	1.5" BSP BACKNUT	UPVC	2
11	THRUST RING	MOPE OR UPVC	1
10	ANTI-ROTATION COLLET	ABS	2
9	ADAPTOR	THERMOPLASTIC	2
8	RETAINING RING (PORT)	S.T. ST. 316	2
7	RETAINING RING	S.T. ST. 316	2
6	RETAINING RING	2MNC 1470 SRT 185 E	2
5	BACKING PLATE	2MNC 1818 185 G	2
4	END PLATE	2MNC 1397 185 G	2
3	PRODUCT TUBE	2MNC 3369 185 A	2
2	FEED CONCENTRATE PORT	2MNC 1953 185 H	2
1	VESSEL BODY	2MNC 1650 185 J	2
		GLASS FIBRE EPOXY RESIN	1